

Claims

1. A process for the production of CS particles and/or microcapsules having the steps:
 - 5 - porous templates (2) are prepared, the templates (2) being porous organic and/or inorganic microparticles having a diameter of less than 100 μm ;
 - 10 - at least one active compound (4) to be encapsulated is adsorbed in the porous templates (2);
 - at least one primer layer (6) is applied to the porous templates (2); and
 - 15 - a capsule shell (8) is formed around the porous templates (2) provided with the primer layer (6) by applying alternately charged poly-electrolyte and/or nanoparticle layers to the porous templates,
 - the primer layer (6) being formed from a material which closes the pores of the porous templates (2) and is largely impermeable to the coating materials used for the production of the capsule shell.
- 25 2. The process as claimed in claim 1, wherein the porous templates (2) contain pores having a pore width of 0.3 nm - 100 nm and preferably of 1 nm - 30 nm.
- 30 3. The process as claimed in one of the preceding claims, wherein the templates (2) are porous silica particles and/or porous zeolite particles and/or porous polystyrene particles.
- 35 4. The process as claimed in claim 3, wherein the porous silica particles are in the size range from 100 nm to 100 μm and preferably from 500 nm to 30 μm .
5. The process as claimed in claim 3, wherein the

porous zeolite particles have a pore width of 0.3 nm to 10 nm.

6. The process as claimed in one of the preceding 5 claims, wherein the at least one active compound (4) to be encapsulated is at least one polymer and/or protein and/or organic molecule having a molecular weight of over 100 g/mol and/or nanoparticle and in particular one enzyme and/or catalyst and/or dye and/or 10 pharmaceutical or cosmetic active compound.

7. The process as claimed in one of the preceding claims, wherein at least one auxiliary is used for mediating the adsorption of the at least one active 15 compound (4).

8. The process as claimed in one of the preceding claims, wherein polyelectrolytes and/or nanoparticles are used as an active compound and wherein the surface 20 of the pore cavities is coated by a number of layers of alternately charged polyelectrolytes and/or nanoparticles.

9. The process as claimed in one of the preceding 25 claims, wherein the porous templates (2) are prepared in a solution and, additionally or alternatively to the auxiliary, the adsorption of the at least one active compound (4) is controlled by changing the pH of the solution.

30 10. The process as claimed in one of the preceding claims, wherein the porous templates (2) are dissolved after formation of the capsule shell (8) and as a result the microcapsules are formed.

35 11. The process as claimed in claim 10, wherein the silica and/or zeolite templates are dissolved by fluoride salts in the presence of a buffer solution having a pH of between 3.5 and 6.

12. A CS particle having

- a diameter of less than 100 μm ;
- a porous core (2) in which at least one active compound (4) is adsorbed;
- 5 - a primer layer (6) which surrounds the porous core (2); and
- a capsule shell (8) of a number of layers of alternately charged polyelectrolyte and/or nanoparticle layers,
- 10 - the primer layer 6 consisting of a material which closes the pores of the porous core (4) and is largely impermeable to the coating materials of which the capsule shell (8) consists.

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13. The CS particle as claimed in claim 12, wherein the porous cores (2) contain pores having a pore width of 0.3 nm - 100 nm and preferably of 1 nm - 30 nm.

20 14. The CS particle as claimed in claim 12 or 13, wherein the cores (2) are porous organic and/or inorganic microparticles having a diameter of less than 100 μm .

25 15. The CS particle as claimed in one of claims 12 to 14, wherein the cores (2) are porous silica particles and/or porous zeolite particles and/or porous polystyrene particles.

30 16. The CS particle as claimed in one of claims 12 to 15, wherein the cores (2) are porous silica particles in the size range from 100 nm to 100 μm and preferably from 500 nm to 30 μm .

35 17. The CS particle as claimed in one of claims 12 to 16, wherein the cores (2) are porous zeolite particles having a pore width of 0.3 nm to 10 nm.

18. A microcapsule having

- a diameter of less than 100 μm ;
- a capsule shell (8) of a number of layers of alternately charged polyelectrolyte and/or nanoparticle layers;
- 5 - a primer layer (6) on the inside of the capsule shell; and
- an inner framework (16) of polyelectrolyte complexes and/or polyelectrolyte/nanoparticle complexes which is surrounded by the primer
- 10 layer and the capsule shell.

19. The CS particle or microcapsule as claimed in one of claims 12 to 18, wherein the primer layer (6) and the capsule shell (8) consist of different materials.

15 20. The CS particle or microcapsule as claimed in one of claims 12 to 19, wherein the at least one active compound (4) is a protein and/or polymer and/or enzyme and/or catalyst and/or dye and/or nanoparticle.

20 21. A process for the production of microcapsules having the steps:

- at least one porous template (2) is prepared, the template (2) being a porous organic and/or inorganic microparticle having a diameter of less than 100 μm ;
- the surface of the pore cavities of the porous template (2) is coated with a number of layers of alternately charged polyelectrolytes (14) and/or nanoparticles (14);
- 25 - at least one primer layer (6) is applied to the porous template (2);
- a capsule shell (8) is formed around the porous template (2) provided with the primer layer (6) by applying alternately charged polyelectrolyte and/or nanoparticle layers to the porous template, the primer layer (6) being formed from a material which closes the pores of the porous template (2) and is largely impermeable
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to the coating materials used for the production of the capsule shell; and

- the porous template (2) is dissolved.

5 22. The use of the CS particles and/or microcapsules as claimed in one of claims 12 to 20 and/or the use of the CS particles and/or microcapsules produced as claimed in one of claims 1 to 11 and 21

- for the encapsulation of substances in the fields of diagnosis, sensors; and/or
- for the selective accumulation of substances from solutions for applications in water purification, diagnostics, nuclear chemistry etc.; and/or
- 10 - for the inclusion of substances having catalytic action, in particular metals and/or metal oxides and/or enzymes, for the catalysis of chemical and biochemical reactions; and/or
- for the encapsulation of nanoparticles, in particular for the production of fluorescent or magnetic microcapsules, for diagnostic or medical applications; and/or
- 15 - for the encapsulation and release of active compounds in the pharmaceutical and cosmetics industry; and/or
- for separation purposes, e.g. in chromatography; and/or
- 20 - for applications in the foodstuffs industry and agriculture and forestry.